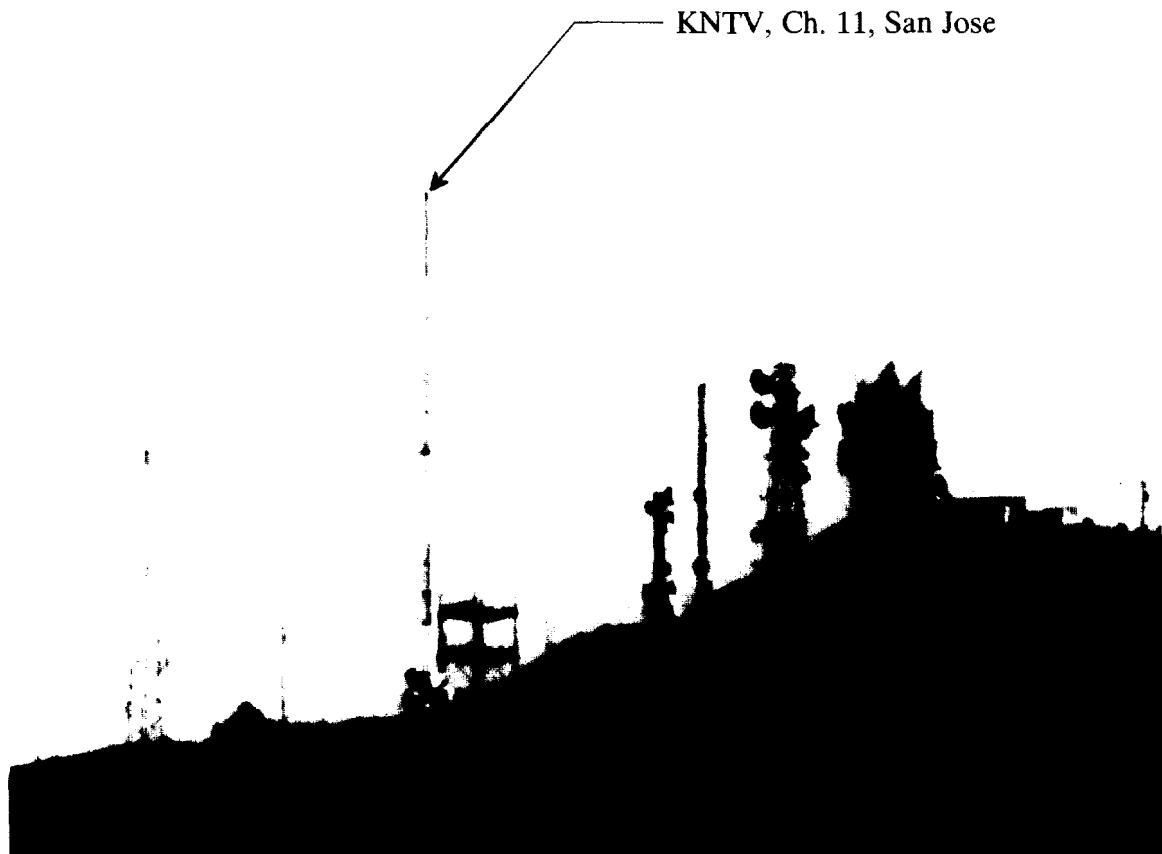


**MM DOCKET 93-142 COMMENTS  
PROPOSED DELETION OF CHANNEL 11 ALLOCATION  
WILLITS, CALIFORNIA**

**LOMA PRIETA SITE PHOTOGRAPH**

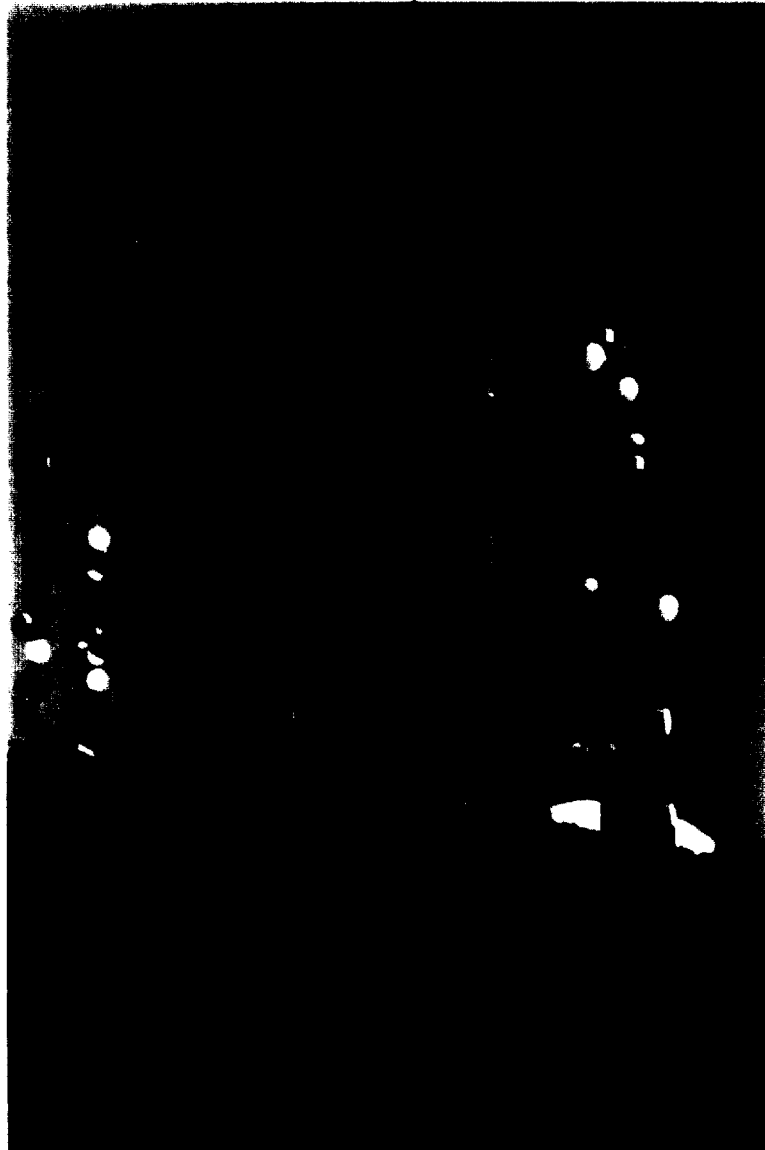


Loma Prieta communications site.

**MM DOCKET 93-142 COMMENTS  
PROPOSED DELETION OF CHANNEL 11 ALLOCATION  
WILLITS, CALIFORNIA**

**LOMA PRIETA SITE PHOTOGRAPH**

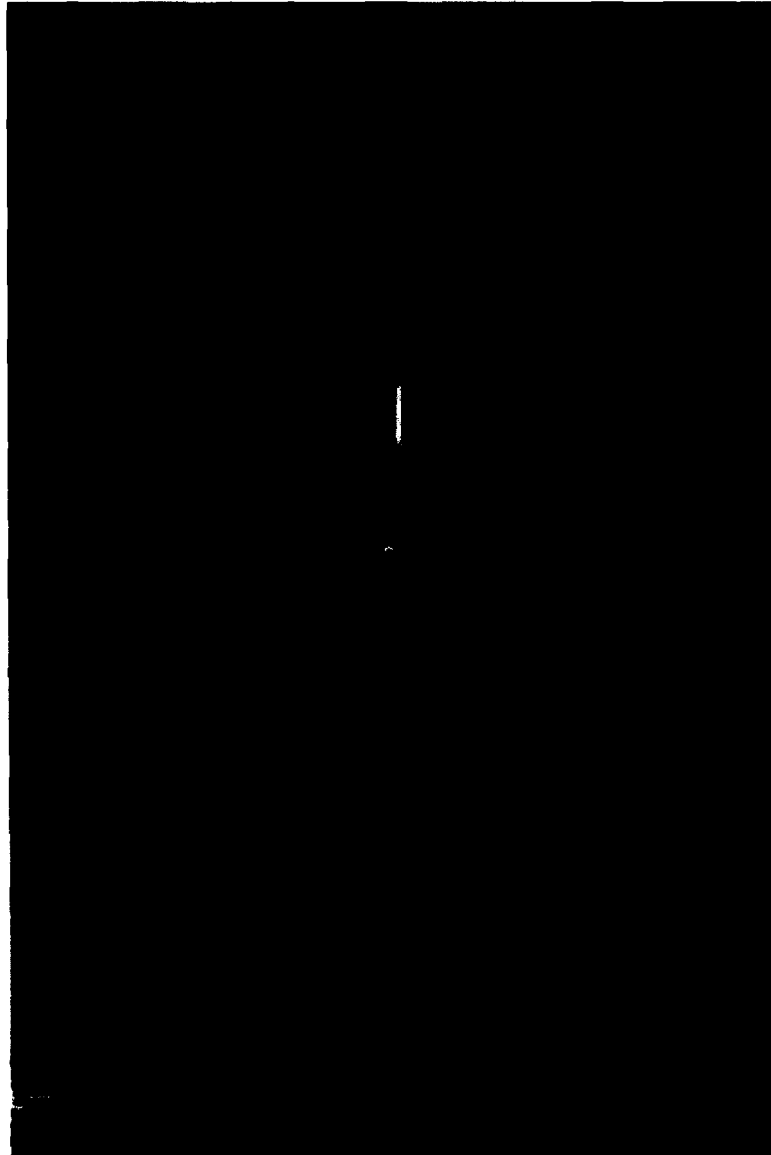
KNTV, Ch. 11, San Jose



**KNTV tower at Loma Prieta.**  
The KNTV tower also supports the antenna of FM Station KBAY

**MM DOCKET 93-142 COMMENTS  
PROPOSED DELETION OF CHANNEL 11 ALLOCATION  
WILLITS, CALIFORNIA**

**LOMA PRIETA SITE PHOTOGRAPH**



**KNTV tower at Loma Prieta.**



**HAMMETT & EDISON, INC.**  
CONSULTING ENGINEERS  
SAN FRANCISCO

930708  
FIGURE 7C



500 MARKET PLACE TOWER, 2025 FIRST AVENUE, SEATTLE, WASHINGTON 98121  
(206) 728-0744 FAX: (206) 727-3350

I, C.B. Crouse, declare the following:

1. I am an Associate in the Earthquake Engineering Group at Dames & Moore, Inc., an international consulting engineering firm headquartered in Los Angeles, California. I have been employed with the firm since August 1988. Prior to joining Dames & Moore, Inc., I was employed from June 1974 to July 1988 with the Earth Technology Corporation, a consulting engineering firm headquartered in Long Beach, California. My entire 19 year professional career has been in the field of earthquake engineering including the disciplines of soil dynamics, structural dynamics, and engineering seismology.

2. I have performed over 100 site specific seismic hazard evaluations for existing or



6. I am a registered Civil Engineer in the State of California (Registration No. C29085).
7. My curriculum vitae is presented as Exhibit 1.
8. I have been retained by Hammett & Edison, Inc. to review (a) the seismic hazard of the transmitter tower site of TV Station KNTV, and (b) the Declaration of Richard E. Hammond contained in the Petition for Rulemaking filed with the FCC on February 18, 1993, by Akin, Gump, Strauss, Hauer & Field, L.L.P. on behalf of Granite Broadcasting Corporation and KNTV, Inc.
9. I reviewed available publications and maps dealing with the seismic hazard of the site region and discussed some of this information with Jim Hengesh, geologist in the Dames & Moore San Francisco office, and Robert McLaughlin, geologist with the U.S. Geological Survey in Menlo Park, California.
10. As part of my review, I visited the site on July 10, 1993, and observed the location of the tower structure, the surficial geology, and the topography of the site.
11. Based on my review of the literature, discussions with the two aforementioned geologists and observations during the site visit, I conclude that during the assumed remaining life of the tower (~ 30 years), the site on which it is located will probably not experience shaking as strong (~ 0.5g) as it experienced during the 1989 Loma Prieta earthquake. Based on the site's stable performance during the 1989 Loma Prieta earthquake, it is unlikely that the site will experience significant ground cracking, slumping, fissures, or landslides resulting from ground motions less severe than the site experienced during the 1989 event. Furthermore, based on the distribution of Quaternary faults in the San Francisco Bay region, the proximity of mountain peaks to these faults, and the relatively high probability of a major earthquake of magnitude  $M=7$  on the San Francisco Peninsula segment of the San Andreas fault during the next 30 years, I conclude that the ground-motion hazard on those peaks in the San Francisco Bay region that might serve as adequate television transmission locations, is at least comparable or possibly greater than the ground-motion hazard at the tower's present

location at Loma Prieta peak. The reasons for my conclusions in this paragraph are provided in the following paragraphs.

12. The tower is located adjacent to Loma Prieta peak in the Santa Cruz mountains (see Attachment A, Ref. 1). The peak is within the Sargent fault zone (see Attachments B and C, Ref. 2), which has shown evidence of movements during the Holocene, *i.e.* approximately last 10,000 years (Ref. 3). The primary surficial trace of this fault trends in the ESE direction and passes within approximately one-half kilometer of the tower facility. The San Andreas fault trends in the SE direction and passes within approximately 3 kilometers of the site (see Attachment D, Ref. 3).

13. The epicenter of the 1989 Loma Prieta earthquake was located approximately 8 kilometers SW of Loma Prieta peak (Attachment F, Ref. 4). The inferred fault rupture for this earthquake, shown in Attachment E, is coincident with the Santa Cruz Mountain segment of the San Andreas fault, which prior to the 1989 event was estimated to have a 30 percent probability of generating a M~6.5 earthquake in the time period 1988 to 2018. This probability estimate was made in 1988 by The Working Group in California Earthquake Probabilities, which consisted of 12 highly qualified experts in the earthquake field (Ref. 5). The group reconvened after the 1989 earthquake and re-evaluated the probabilities of major earthquakes on segments of the San Andreas fault in the San Francisco Bay area and estimated the probabilities of major earthquakes on the Hayward and Rodgers Creek faults in the East Bay area. They concluded that the probability of a M=7 event on the Santa Cruz Mountains segment during the period 1990 to 2020 was essentially zero, and that the probability in the same period of a similar size event on the San Francisco Peninsula segment was 0.23 (Attachment F, Ref. 6). Thus, according to The Working Group, the 1989 Loma Prieta earthquake essentially eliminated the risk of another major earthquake in the next 30 years on the Santa Cruz Mountain segment of the San Andreas fault, whereas the group estimated the risk to have slightly increased on the adjacent San Francisco Peninsula segment since their 1988 report (Ref. 5) was published.

14. The ground shaking that the Loma Prieta peak site experienced during the 1989 Loma Prieta earthquake was estimated to have been greater than 0.4g (Attachment G, Ref. 7). The largest peak ground acceleration (0.64g) was recorded at Corralitos,

located approximately 1 kilometer from the surface trace of the San Andreas fault. The Loma Prieta peak was located approximately 3 kilometers from the fault. Based on a plot of the peak ground accelerations recorded on rock sites during the 1989 Loma Prieta earthquake versus distance from the fault rupture of this event, the peak ground acceleration at the Loma Prieta peak was probably on the order of 0.5g or greater (Attachment H, Ref. 8).

15. The probability that the site will experience ground shaking during the next 30 years that is as strong or stronger than the level it experienced during the 1989 Loma Prieta earthquake is small in my opinion because the earthquake threat from the Santa Cruz segment of the San Andreas fault is believed to be negligible during this period. Also, because the 1989 Loma Prieta event did not generate any ground failures during the estimated intense shaking at the site, the probability that earthquake-induced ground failures will occur at the site during the next 30 years is also small in my opinion.

16. Relocating the tower from Loma Prieta peak to another peak to the northwest will most likely increase the ground shaking hazard that the tower might experience, not decrease it as suggested in Paragraph 5 of the Declaration of Richard E. Hammond. All viable peaks northwest of Loma Prieta peak in the San Francisco Peninsula region appear to be within 5 kilometers of the San Andreas fault. Peaks in this region are much closer to the San Francisco Peninsula segment of the San Andreas fault than is the Loma Prieta peak. As noted in Paragraph 13 of this testimony, the probability of a M=7 earthquake on this segment in the period 1990 to 2020 is 0.23 (Ref. 6), whereas, the probability of a similar event at the Loma Prieta site on the Santa Cruz segment is believed to be negligible.

17. The San Andreas fault is not the only fault in the San Francisco Bay area capable of generating large earthquakes, but the San Francisco Peninsula segment of this fault is probably more likely to generate the next major event in the South San Francisco/Silicon Valley area than another Quaternary fault in this immediate area.

18. The Hayward fault in the East Bay area also represents a significant hazard to facilities on peaks in this region. As shown in Attachment F (Ref. 6), the estimated

probabilities of a M=7 event on the Southern East Bay segment or Northern East Bay segment of this fault during the period 1990 to 2020 are 0.23 and 0.28, respectively.

19. Although the seismic hazard at Loma Prieta peak may not be as great as on other peaks in the Bay area, there is still a significant seismic hazard at this site which should be considered in seismic vulnerability studies of the tower. I recommend that 0.4g be considered as an Upper Level Earthquake (ULE), i.e. shaking that has a small probability of occurrence during an assumed remaining tower life of 30 years, and that 0.2g be considered as a Lower Level Earthquake (LLE), i.e. shaking that has a reasonable probability of occurrence in this period. Under the ULE shaking, the tower should not collapse and under the LLE shaking the tower should not be damaged. Similar performance criteria are typically adopted in the analysis and design of many structures and are implicit in several seismic codes or provisions. The Soil Type 1 Normalized Response Spectra Shape, shown in Figure No. 23-3 of the 1991 Uniform Building Code and scaled to the LLE or ULE acceleration levels, is recommended for any linear dynamic analysis of the tower structure that may be performed.

20. I declare that the foregoing is true to the best of my knowledge and belief.

July 14, 1993

  
C.B. Crouse, P.E.





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# Curriculum Vitae

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**C. B. CROUSE**

**TITLE**

Associate

**EXPERTISE**

Probabilistic and Deterministic Seismic Hazard Analyses  
Development of Seismic Design Criteria  
Ground-Motion Analyses  
Site-Response and Soil-Liquefaction Studies  
Seismic Soil-Structure Interaction Investigations

**PROFESSIONAL  
EXPERIENCE**

Dr. Crouse has 19 years of professional experience in earthquake engineering and engineering seismology. He has been responsible for managing and performing technical projects involving: determination of seismic design criteria and seismic design of structures, seismic safety surveys for existing structures, dynamic analysis of soil-structure interaction, seismic response of foundation soils, vibration testing of structures in the field, seismic hazard analysis, probability studies of environmental loads, studies of soil liquefaction, and centrifuge modeling of soil-structure systems. Projects included DOE facilities, nuclear and conventional power plants, off-shore structures, LNG and water-storage tanks, multi-story buildings, dams and reservoirs, hospitals, bridges, electrical transmission facilities, pipelines, and the superconducting super collider.

**Dames & Moore, Inc. (1988 - present)**

Performs probabilistic and deterministic seismic hazard analyses, ground-motion, site-response and soil-liquefaction studies, and seismic soil-structure interaction investigations.

**Project Manager/Principal Investigator**

- Evaluation of the site response for the Nuclear Regulatory Commission, National Service Foundation, and California Division of Mines and Geology. Evaluation includes calculation of site-amplification factors and site-dependent spectra from earthquake motions recorded on different local geologies.
- Seismic hazard evaluations for John Hart, Jordan River, Buntzen, Cleveland, and Seymour Falls dams in British Columbia, and Tolt and Cedar Falls dams in western Washington, and S. Haiwee dam in California. Evaluations included determination of Maximum Credible Earthquake and associated ground-motion parameters.
- Seismological and ground-motion studies for two hospital sites in southern California. Studies included evaluations of the regional seismic recurrence rates based on historical seismicity and geologic data from active faults and applicability of published ground-motion attenuation equations.

- Seismic design study for BE&C Engineers. Study included seismic hazard analysis, development of seismic design criteria, and application of criteria to design of Boeing's essential and critical buildings.
- Seismic hazard analyses of existing offshore platform sites in Huntington Beach, California, Santa Barbara Channel, and New Zealand. Analyses included evaluation of geologic and tectonic data, historical seismicity, and recorded ground motions. Ground motions for use in structural stability evaluations were estimated using probabilistic and deterministic methods.
- Seismic hazard analysis for Trans Mountain Oil Pipeline Company. Studies included probabilistic and deterministic estimates of ground motion and development of seismic design parameters for proposed oil pipeline facility in northwestern Washington.
- Seismic hazard evaluations for the San Francisco, San Jose, Los Angeles, Fullerton, and San Diego campus sites of the California State University system. Evaluations included the determination of earthquake ground motions for use in the seismic evaluation of campus parking structures.
- Seismic hazard analyses of the Western Washington University campus. Studies included probabilistic and deterministic estimates of ground motion, development of seismic design criteria for soft and firm soil, and evaluations of liquefaction and slope stability.
- Ground-motion attenuation investigation of subduction-zone earthquakes in the Pacific Northwest for the U.S. Geological Survey and Electric Power Research Institute. Investigation included development of attenuation equations applicable to subduction-zone earthquakes in the region.
- Centrifuge studies of soil liquefaction and site response for the U.S. Geological Survey and Nuclear Regulatory Commission. Studies included dynamic tests of saturated sand in the Caltech centrifuge and analytical modeling of the recorded data.

#### Earth Technology Corp. (1974-1988)

- Performed seismic hazard analyses and developed seismic design criteria for nuclear power plants, offshore platforms, dams, substations, pipelines, and buildings in North America, Central America, Europe, Africa, Asia and Australia.
- Conducted experimental and analytical investigations of soil-structure interaction for buildings, bridges, power plants, machine foundations, offshore platforms, and transformer foundations.
- Performed industry and government-sponsored research on earthquake ground motion, soil liquefaction and soil-structure interaction.

ACADEMIC  
BACKGROUND

Ph.D., (1973), and M.S., (1969), Civil Engineering, California Institute of Technology, Pasadena, California.

**COUNTRIES  
WORKED IN**

United States, New Zealand, Canada, Taiwan, and Japan

**REGISTRATION**

Civil Engineering: California, 1978, Registration No. C29085

**PROFESSIONAL  
ACTIVITIES**

American Society of Civil Engineers - Member

- Member and Past Chairman of TCLEE Gas and Liquid Fuels Lifeline Committee.
- Member of TCLEE Seismic Risk Committee.
- Member of TCLEE Transportation Committee

Earthquake Engineering Research Institute - Member

- Member of Board of Directors
- Member of Strong Motion Instrumentation Committee

Seismological Society of America - Member

- Associate Editor

Structural Engineers Association of Washington - Member

Structural Engineers Association of California - Former Member

- Former Member of Seismology Committee

U.S. Transportation Research Board

- Member of Dynamic Testing and Analysis of Bridges Committee

U.S. National Research Council

- Former Member of Committee on Earthquake Engineering

National Science Foundation

- Member of BCS Advisory Committee
- Past Member of Panel to evaluate National Center for Earthquake Engineering Research

Building Seismic Safety Council

- Participant in workshop to develop plan for developing national standards for lifelines
- Participant in workshop on development of ground-motion maps for national building codes

## PUBLICATIONS

## BOOKS

Eguchi, R., and C.B. Crouse (Editors), 1986. Lifeline Seismic Risk Analysis - Case Studies: American Society of Civil Engineers, N.Y., N.Y., 138p.

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PH.D. THESIS

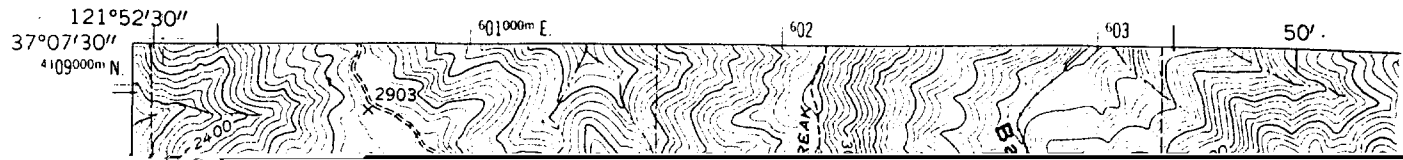
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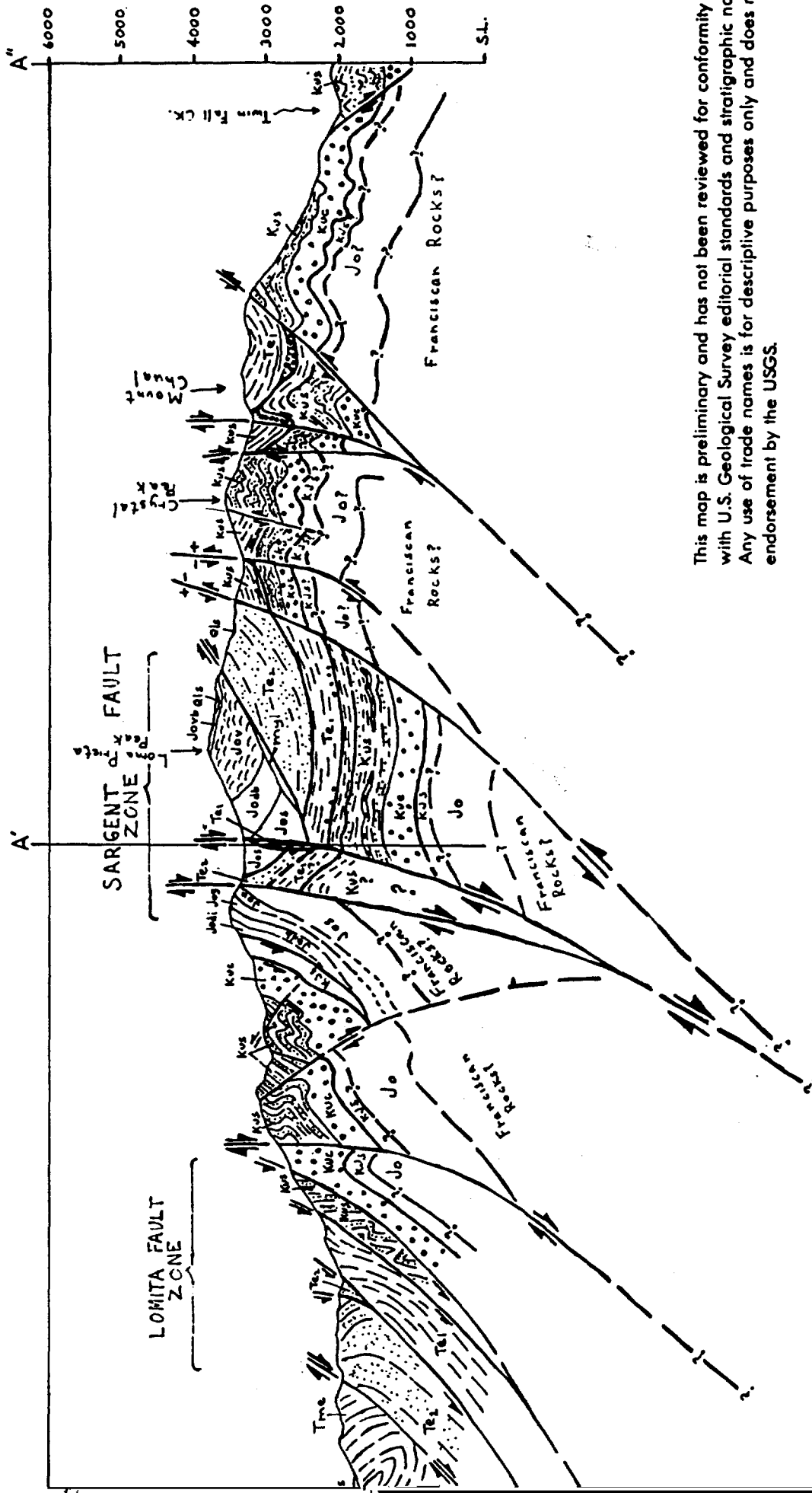
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UNITED STATES  
DEPARTMENT OF THE INTERIOR  
GEOLOGICAL SURVEY

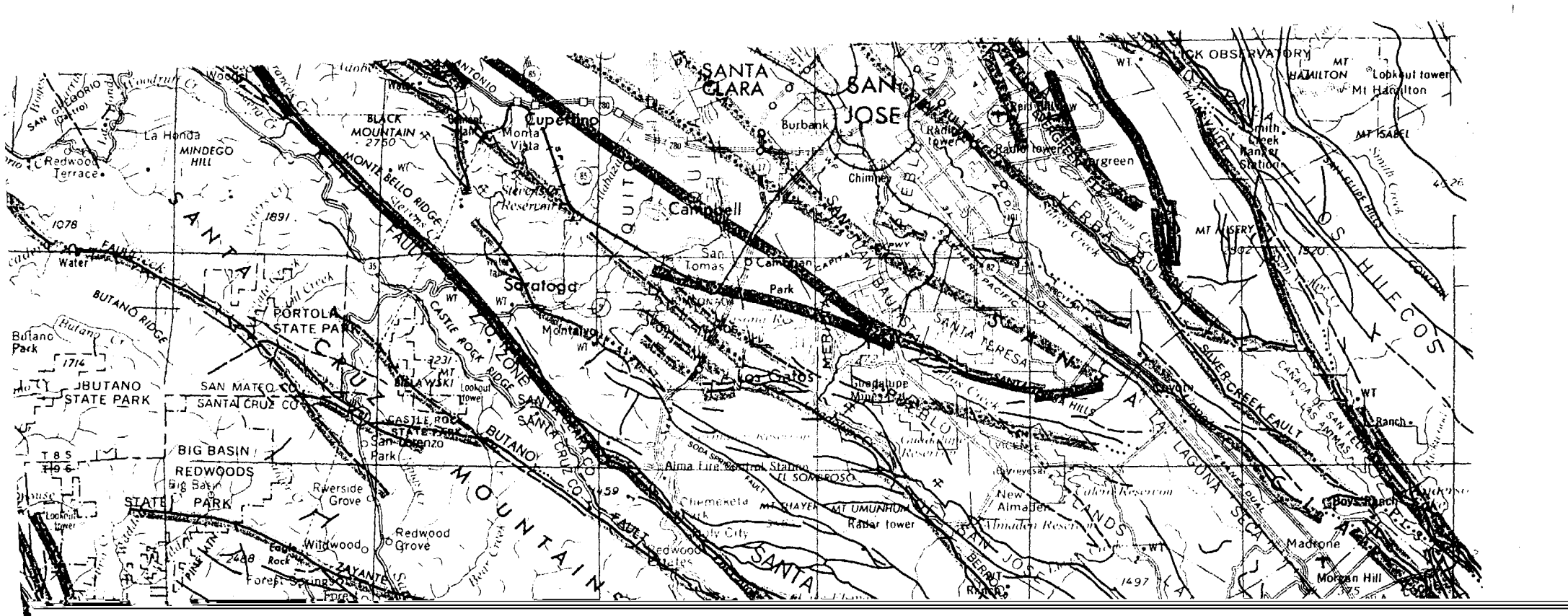
ATTACHMENT A

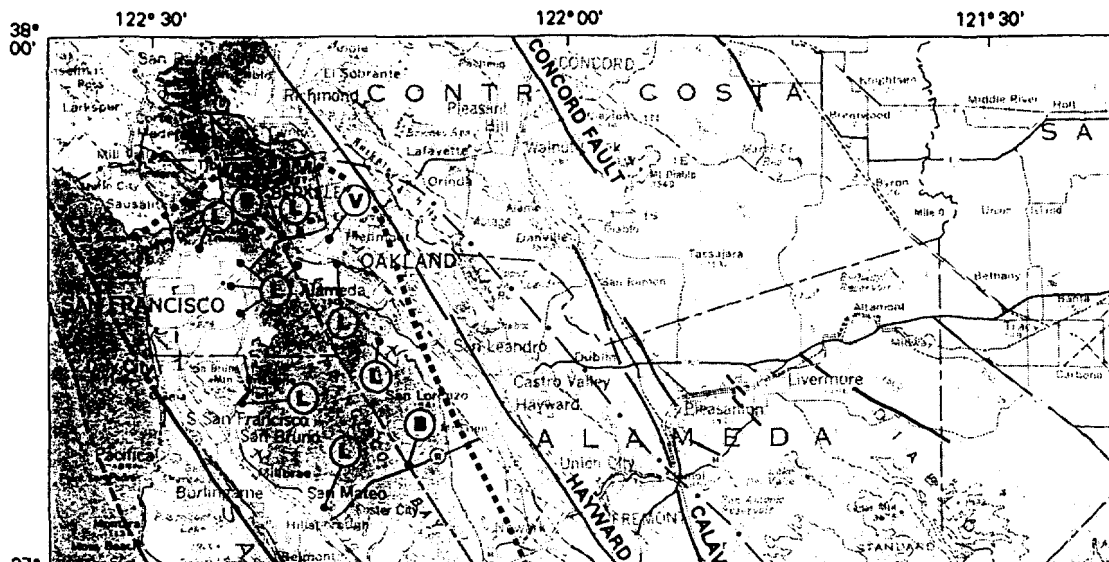
*SOURCE: REF. 1*





This map is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards and stratigraphic nomenclature. Any use of trade names is for descriptive purposes only and does not imply endorsement by the USGS.





## EXPLANATION

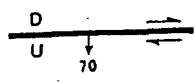





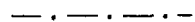




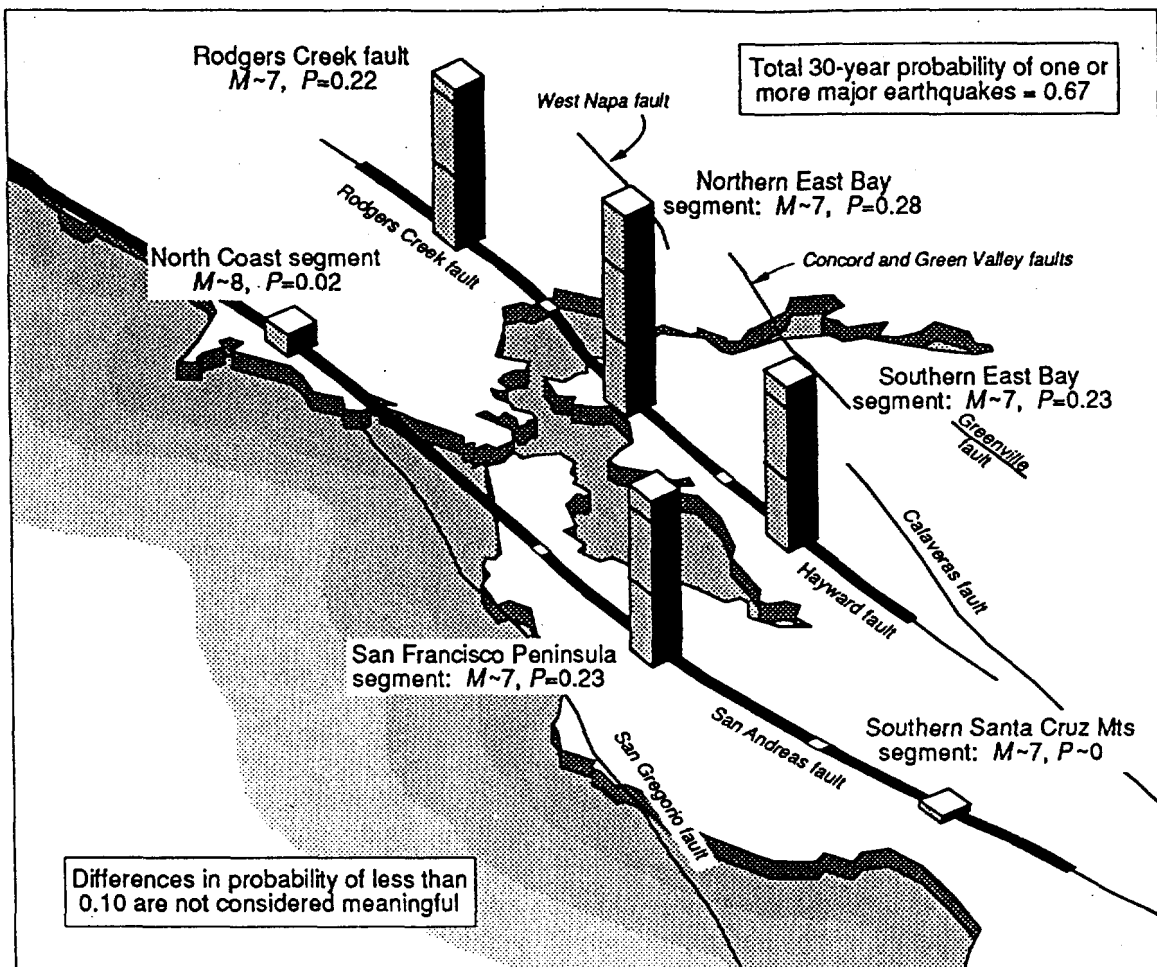
	Fault rupture of Loma Prieta earthquake--Arrows show relative horizontal movement; small arrow and numeral show direction and amount of dip; U, upthrown side; D, downthrown side
	Fault--Dashed where approximately located
	Main shock epicenter
	Area of aftershocks and abundant landslides
	Area of ground cracks possibly related to faulting
	Approximate limit of major structural damage
	Approximate limit of landslides
	Prominent area of liquefaction
	Damaged bridge
	Damaged dam
	Damaged two-story viaduct

Figure 1. Continued

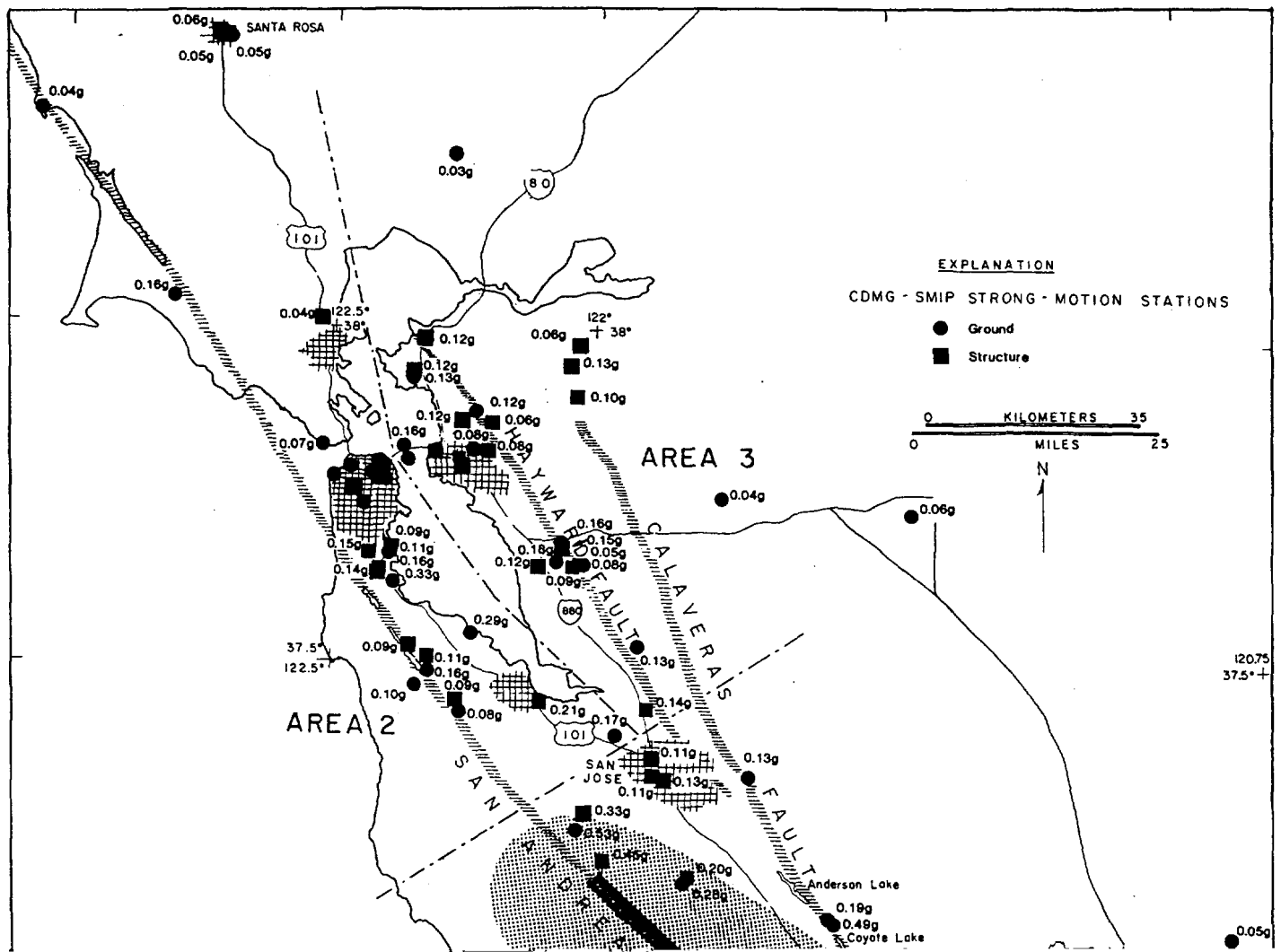


# 30-YEAR PROBABILITIES ( $P$ ) OF LARGE EARTHQUAKES ( $M \geq 7$ ) IN THE SAN FRANCISCO BAY REGION

Column heights are proportional to 30-year probability of earthquake rupture

ATTACHMENT F

SOURCE: REF. 6





ATTACHMENT H

SOURCE: REF. 8

